XXXII. *Obſervations made at* Leiceſter *on the Tranſit of* Venus *over the* Sun, June 3, 1769. *By the Reverend Mr.* Ludlam, *Vicar of* Norton, *near* Leiceſter.

Read Nov. 16, 1769.

THE teleſcope, uſed for viewing the planet, was made by Mr. Dollond, with a triple object glaſs of $33\frac{1}{3}$ inches focal diſtance, and was found by experiment to magnify 54 times. The clock was firmly fixed; its pendulum rod was made of wood. The tranſit teleſcope was not accurately adjuſted either to the meridian or horizon, but the tranſits of the Sun and of η Bootis regiſtered below are ſufficient to ſhow the rate of the going of the clock, and the correſponding altitudes of the Sun, its error a few days before the tranſit of the planet; whence the neceſſary reduction of the time then ſhewn by the clock to apparent time may be eaſily derived.

Obſervations for examining the clock.

TRANSITS.

Day of the month, 1769.	Time by the Clock.								Object
	First Wire.		Paſſage over Meridian.			Third Wire			
	′	″	h	′	″	′	″		
May 28	17	12	IX	18	0	18	47½		η Bootis
	Clouds		Clouds			Clouds			Sun
	Clouds		XXIII	59	1	59	50		
29	13	19½	IX	14	7½	14	54		η Bootis
31	56	29	XXIII	57	17½	58	6½		Sun
	58	46		59	35	0	23½		
June 1	56	39	XXIII	57	28½	58	17		Sun
	58	56		59	46	0	34		
2	57	43½	VIII	58	32	59	19		η Bootis

Correſponding altitudes of the Sun, taken by reflection from water, with an Hadley's quadrant of ſix inches radius.

Sun's double alt. 79° 54′ May 29, 1769

	Time by the Clock								
	Eaſtern Az.			Weſtern Az.			Meridian		
	h	′	″						
Up. limb	VIII	28	33	III	27	39	XI	58	6
Center		30	17½		25	51½			4½
Low. limb		32	8		23	57½			2¾
	Mean						XI	58	$4\frac{5}{12}$

Sun's

Sun's double alt. 82° 55′ May 29, 1769

	Time by the Clock								
	Eaſtern Az.			Weſtern Az.			Meridian		
	h	′	″	h	′	″	h	′	″
Up. limb	VIII	39	0	III	17	8	XI	58	4
Center		40	$51\frac{1}{2}$		15	18			$4\frac{3}{4}$
Low. limb		42	$42\frac{1}{2}$		13	25			$3\frac{3}{4}$
Mean							XI	58	$4\frac{1}{6}$
Mean of both ſets					h	′	XI	58	$4\frac{7}{24}$
Corⁿ for the interv.					7	0			$7\frac{5}{8}$
Paſſage over meridian							XI	57	$56\frac{2}{3}$
Equat. of time								3	3
Clock faſter than mean time									$59\frac{2}{3}$

Sun's double alt. 96° 58′ June 2, 1769

	Time by the Clock.								
	Eaſtern Az.			Weſtern Az.			Meridian		
Up. limb	IX	27	50	II	29	44	XI	58	47
Center		29	57		27	41			49
Low. limb		32	$1\frac{1}{2}$		25	36			$48\frac{3}{4}$
Mean					h	′	XI	58	48,25
Corⁿ for interv.					5	0			5,65
Paſſage over meridian							XI	58	42,6
Equat. of time								2	28,4
Clock faſter than mean time								1	11

If we ſuppoſe the clock to be 1′ 11″ faſter than mean time, on June the ſecond at noon, and to gain at the rate of $2\frac{1}{2}$ ſeconds in a day, then at the time of the tranſit of the planet it was one minute and one ſecond ſlower than apparent time.

At VII^{h} 6′ 0″, according to the time ſhewn by the clock, a ſmall indenture appeared on the Sun's limb; the increaſe of it at VII^{h} 6′ 14″, ſhewed plainly that it was made by the expected planet.

The

The internal contact was firſt noted at VII^{h} 23′ 56″; at VII^{h} 24′ 8″, the divided part of the Sun's limb ſeemed wholly united.

The edge both of the Sun and Planet were in a continual tremor; at the internal contact the limb of the Sun ſeemed, for ſeveral ſeconds, to be alternately united and again ſeparated by a kind of ſhootings of the Planet.

Theſe obſervations, reduced to apparent time, give the external contact at VII^{h} 7′ 1″, the internal contact at VII^{h} 25′ 9″, the duration 18′ 8″.

The ſolar eclipſe was obſerved by the ſame clock and teleſcope. It was manifeſtly begun at XVIII^{h} 34′ 26″, according to the time ſhewn by the clock. The ending was exactly noted at XX^{h} 20′ 8″. The Sun's limb appeared very well defined all the morning. Theſe obſervations, reduced to ſolar time, make the beginning of the eclipſe at XVIII^{h} 35′ 21″, the end at XX^{h} 21′ 2″, the duration 1^{h} 45′ 41″.

Obſervations made at Leiceſter, with an Hadley's quadrant, of ſix inches radius, for determining the latitude of the place.

1769		°	′
April 27	Sun's diameter on quadrantal arch		32
	on arch of exceſs		33
	repeated on quad. arch		32
	on arch of exceſs		32
	Sum of the meridian altitude of the Sun's upper limb, and its depreſſion, when reflected by water	103	20½
	of the lower limb	102	18
29	Sun's diameter on quadrantal arch		32½

April

		°	′
1769 April 29	Sun's diameter on arch of exceſs		32
	repeated on quadrantal arch		33
	on arch of exceſs		32 +
	Merid. alt. and depreſſion of Sun's upper limb, reflected by water	104	36
	of the lower limb	103	31
June 11	Sun's diameter on quadrantal arch		33
	on arch of exceſs		30
	repeated on quad. arch		33
	on arch of exceſs		30
	Merid. alt. and depreſſion of Sun's upper limb, reflected by water	121	36½
	of the lower limb	120	33
15	Sun's diameter on quad. arch		33½
	on arch of exceſs		30
	repeated on quad. arch		33½
	on arch of exceſs		30
	Merid. alt. and depreſſ. of Sun's upper limb, reflected by water	122	2½
	of the lower limb	121	59½

	°	′	″
The latitude of Leiceſter, deduced from the obſervations of April 27, is	52	36	21
of April 29,	52	37	3
of June 11,	52	37	35
of June 15,	52	37	12
Mean of theſe four obſervations	52	37	3
The latitude of Market Harborough, in Leiceſterſhire, from the mean of ſeveral accurate obſervations of the Sun's image, projected into a dark room, by S. Rouſe	52	28	30